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AN AGENDA FOR QUANTITATIVE RESEARCH ON TERRORISM(U)  
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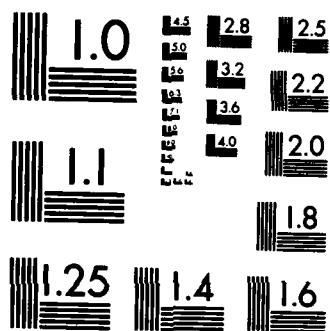
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AN AGENDA FOR QUANTITATIVE RESEARCH ON TERRORISM

William W. Fowler

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## Introduction

The purpose of this paper is to outline how data bases containing numeric data on terrorism might be analyzed. The first part is devoted to a definition of the research problem and a brief statement of the objectives and substance of the proposal. The second section discusses the design and content of numeric data bases on terrorism, and relates this to the appropriate use of quantitative methods. The next section discusses the levels of analysis of terrorist behavior, and their importance to the analysis terrorism. The next section presents a general strategy and specific proposals for the analysis of numeric terrorism data. The final section presents an agenda for research, where specific issues of interest are identified.

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## Overview

Numeric data bases can support the application of quantitative methods to the study of terrorism. This paper suggests the development and application of certain methods that can ultimately provide a system for monitoring and projecting aggregate trends in subnational violence. In the shorter term, such research would develop methods to extract information for basic research and the analysis of policy.

The proposed approach to research is divided into two interrelated phases. First, methods are developed to create a comprehensive set of profiles that define the behavior patterns of individual terrorist groups. The profiles should be composed of a set of numeric indexes, each of which measures a dimension of terrorist behavior found in most numeric data bases. The set of indexes would include (but not be limited to) measures of the frequency, severity, quality, and effect of terrorist acts. These would then be used in the creation of aggregate profiles to reflect national, regional, and international behavior.

During the second phase, these profiles could be used as an empirical base for a comprehensive modelling effort that includes multivariate, time series, and process analyses. This effort would lead to the development of quantitative monitoring and trend projection tools. Monitoring tools would be used for the evaluation of current trends and projection tools would be used for making estimates of future patterns in terrorism. This research would also address important substantive questions about changes in individual group and aggregate behavior, such as erosion of constraints in the severity of acts or changes in the level of activity during the life cycle of groups.

While the quantitative methods suggested here are not, in and of themselves, necessarily more useful or valid than traditional analytical approaches, the design and content of several numeric data bases would be most effectively exploited by such an approach. Relevant quantitative findings could be used to supplement, support, and provide an analytical counterpoint to other methods and approaches to analysis of terrorism.

### Design and Content of Quantitative Data Bases

Most quantitative data bases represent an attempt to study terrorism in terms of aggregate analysis of individual terrorist incidents. This analytical focus is an alternative to more traditional approaches and is operationalized by the use of quantitative methods. These are not necessarily meant to replace traditional approaches, but rather to supplement, support, and serve as an analytical counterpoint to other endeavors in the study of international terrorism.

The unit-of-analysis of these data bases is the individual terrorist incident. Each entity in the data base seeks to answer the question "who did what to whom and when." The information represented by the incident is the most disaggregated act that can reasonably be called "international terrorism." The approach is designed to reduce, as much as possible, potential research problems caused by the inherent complexity and ideological sensitivity of political terrorism. From an operational standpoint, the payoff of the approach is considerable. While the basic unit of analysis is the terrorist incident, the data can be aggregated on a number of important dimensions, including the crucial dimension of time. For example, the behavior of groups in various geographical units can be monitored through time in a consistent and systematic way. The ability to look at many factors simultaneously in a coherent fashion is a primary advantage in using data bases of this type.

### Levels-of-analysis Problem

There are always a number of ways that social phenomenon can be studied. Research can be focused on individual components of a subject, groupings of those parts, or the phenomenon as a whole. The choice of viewing a subject at a micro level or the macro level is often difficult and controversial. The study of terrorism is no different. Individual terrorists have been studied by psychiatrists while political scientists have studied terrorism's many group manifestations. Moreover, a terrorist act can have significance beyond the immediacy of its own violence and the national and regional boundaries in which it occurs. While the complexity of international terrorism makes attention to the level of analysis crucial, suprisingly little attention has been paid to this problem.

Macro-analytic factors include almost anything that encourages or discourages terrorism and influence its effect. These broader factors, which I will call environmental factors, include such things as the international and national political situations in which terrorists operate, public opinion, and so on. Environmental factors also include aggregates of specific features of terrorist acts. These include, for example, the hypothesized contagion effects among like minded terrorists across national borders. Micro-analytic elements, which I will call behavioral factors, include such specific things as geographic, political, and group attributes of terrorists. Finally, there are idiosyncratic aspects of international terrorism, such as the seasonal variations in the frequency of terrorist attacks.

Data on environmental characteristics of terrorism seem amenable to the development of generalized monitoring and forecasting tools. The analysis of such things as changes in the gross frequency of terrorist incidents provides information about general trends and underlying patterns that are not obvious from analysis of individual incidents. A fundamental goal of research using quantitative data should be to develop generalized monitoring and forecasting tools that provide current information on the volume and spread of international terrorism.

From an operational standpoint, behavioral characteristics of terrorism are aggregated to provide a measure of environmental factors. For example, gross indicators of contagion effects require the analysis of national and regional variations in terrorist behavior. Most numeric data bases provide behavioral data for this use. Generalized monitoring and forecasting methods are based on aggregated behavioral components. Moreover, the analysis of these behavioral aspects of terrorism provides a separate but equally crucial line of inquiry.

All of this should be obvious to even the most unsophisticated researchers. Unfortunately, even the most sophisticated methodologist occasionally fails to consider levels of analysis when doing quantitative analysis, because quantitative methods have no inherent checks on the sensibility of hypothesized relationships among data elements. Moreover, even the most complex quantitative techniques, including mathematical and forecast modelling, can quickly and easily be operationalized with the barest of preparation through the use of computers. Although some would argue that forecast models can be built without much regard to theoretical or even substantive meaning (as in, say, predicting Dow Jones averages on the basis only of past performance), I believe that such models, if indeed they could be developed for international terrorism, would have a minimum of utility and interest.



### A General Strategy for Analysis of International Terrorism

The discussion of the levels of analysis problem emphasized the complexity of terrorist acts and the concomitant complexity of numeric data bases. Terrorism data have complex structural and content components. The effective utilization of these data bases in a well organized and conceptually sound quantitative analysis requires methods that reduce this complexity. I suggest that a set of numerically based indexes be developed, aimed at condensing the numerous variables on individual terrorist acts to a manageable number of important concepts. The development of behavioral profiles will simplify analysis, while maintaining the ability to aggregate the data on a number of dimensions, and maintain the integrity of each level of analysis.

The profiles could be used to observe trends in terrorism at different levels. Behavioral level profiles can provide a description of the behavior of individual terrorist groups in terms of important individual and group factors contained in the data. At the environmental level, profiles can provide simple indexes of the volume and distribution of terrorist acts nationally, regionally, and internationally. More complex indexes can be constructed to describe such things as the victims and targets of terrorist incidents. As an example of their usefulness, indexes measuring the severity of terrorist acts can be used to compare the level of violence of individual groups with regional and international "norms."

While the creation of indexes, in and of itself, could prove useful in the analysis of terrorism, the next logical step is the development of mathematical models based on the aggregated data. These models could address a number of important issues and ultimately be used in forecasting exercises. Such a modelling effort can be divided into the following three areas.

- o The development of multivariate models which includes the use of regression techniques based upon the profiles developed in the first phase.

- o The use of time series models to identify irregular patterns, seasonal variations (if any), and, most important, predictable trends in the time related dimensions of terrorist activities.
- o The development of process models, such as Markov chains, Poisson-based models, and others.

The ultimate goal is to develop a set of monitoring and forecasting tools to better estimate present and future trends in terrorist behavior.

These methods would also prove useful beyond their contribution to monitoring and forecasting. For example, with multivariate analysis one could test for statistical relationships such as one between the number of hostages in barricade incidents and the likelihood of casualties. Process models could help in understanding the life cycle of terrorist groups, the adherence to or erosion of constraints in terrorist activities, and the appearance or non-appearance of innovation in tactics and weapons.

### A Research Agenda

The creation of the numeric indexes described above would provide the empirical base and a foundation of powerful methods for the analysis of numeric data. Of course, quantitative methods can be quite hollow unless they are intimately connected with important and interesting substantive concepts. The following substantive questions that can be addressed by quantitative research are organized around the levels of analysis and methods concepts discussed above. At the environmental level, some of the most basic questions include

- o What is the overall volume of terrorist activity?
- o How is the volume of terrorist incidents distributed by geography, terrorist group, temporally, etc?
- o Are there identifiable quantitative or qualitative patterns in aggregates of terrorist incidents with which behavior of specific groups can be compared?

These questions are directly related to issues important to the development of models of terrorism as an on-going process. These are

- o How does the volume and distribution of terrorist incidents change through time?

- o Has the nature of terrorist acts, in aggregate, changed through time?
- o Are there distinct patterns in the changing distribution of terrorist incidents, such as quantitatively identifiable contagion effects or qualitatively identifiable "erosion of constraints"?

Aggregate behavioral characteristics of terrorism provide the data from which environmental effects are derived. Contagion effects, for example, are identified from changes in the behavior of individual groups. Moreover, more complex and relevant questions, from a policy analysis standpoint, can be addressed at this level. The following questions can be addressed by development of behavioral profiles at lower levels of analysis.

- o Can certain quantitative and/or qualitative patterns of terrorist activity be associated with the geographic region in which they occur or the characteristics of terrorist groups?
- o Are there certain types of terrorist activities associated with specific terrorist organizations?
- o Is the severity of terrorist acts (defined, say, as the number of casualties) associated with such factors as the regional identity or the "maturity" of the group?

- o Does the level and nature of terrorist activity of a specific group relate to its attributes (especially size)?

The relevant profiles could then be used in modelling research that addresses the following sample questions.

- o Can the life-cycle of terrorist groups be modelled on the basis of the frequency, nature, or severity of their violent activities?
- o Are there processes of innovation that are reflected by changes in the characteristics of terrorist behavior within individual or regional groupings of terrorist organizations?

The questions listed above are meant to provide a relevant research agenda that exploits the information contained in many numeric data bases. The agenda focuses on the nature and quantity of terrorism. However, I have gone beyond simple descriptive concepts to time series and process analyses. An attempt has been made to adopt a more sophisticated quantitative approach as well as expand the questions that are addressed by the analysis.

### Conclusion

The above discussion outlines the most important features of a program for the analysis of quantitative data bases. The goal of the program is to understand terrorism in terms of actual terrorist behavior, in addition to qualitative analysis of indirect evidence. The research is attentive to the levels of analysis that appear in the many numeric data bases. The development of profiles and models can be pursued in a step-by-step fashion: Profiles of the attributes of terrorism, of considerable value in and of themselves, can be used as the empirical base for more sophisticated modelling efforts. The specific methodologies, which are only briefly sketched here, depend, to some extent, on the substantive findings of the early phases of research. This approach would provide a systematic and coherent guide for the early research efforts. The research design could culminate in a comprehensive system for monitoring and forecasting changes in the volume, dispersion, and nature of international terrorism.

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